

8EHQ-1102-15223
THE AN GROUP

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November 15, 2002

US Environmental Protection Agency
Office of Pollution Prevention and Toxics
CBI Center
EPA East Building, Room 6428
1201 Constitution Avenue, NW
Washington, DC 20004
Attention: 8(e)

8EHQ-02-15223
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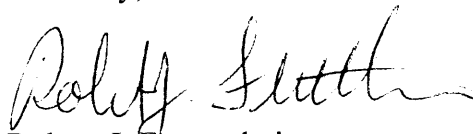
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Dear 8(e) Coordinator:

On behalf of the AN Group and its members, I am submitting the attached manuscript entitled "Neurobehavioral Effects of Occupational Exposure to Acrylonitrile." As you will note, the study was conducted principally by a group of researchers in China who were investigating the neurobehavioral effects in exposed workers. The authors report a potential relationship between AN exposure and "changes in mood and impaired neurobehavioral performance."

The AN Group is not involved with this study and has not assessed the significance of the findings. We are, nonetheless, providing the paper to EPA for its information. If and when we receive the published version of the paper, I will forward a copy. Until it is published, we would anticipate that the authors would appreciate if the preprint could be kept confidential, to facilitate its eventual publication.

Sincerely,



Robert J. Fensterheim
Executive Director

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Neurobehavioral Effects of Occupational Exposure to Acrylonitrile

July 30, 2002

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Word Count: 2,017

Running Title: Neurobehavioral Effects of Acrylonitrile

Abstract

We examined neurobehavioral outcomes of workers exposed to acrylonitrile, a potentially neurotoxic substance. We used the WHO neurobehavioral core test battery to assess the neurobehavioral functions of all study subjects. We compared 81 workers in an acrylonitrile-monomer plant and 94 workers in an acrylic fibers plant with 174 workers with no acrylonitrile exposure. Acrylonitrile workers reported increased tension, depression, anger, fatigue and confusion. Performance in the Simple Reaction Time and Purse Aiming II was also poorer among exposed workers compared to unexposed workers. Some of these poor performances in tests were also related to exposure duration. Given the findings of our study and the limitations of neurobehavioral workplace testing, further studies are needed to characterize potential neurotoxicity from chronic and acute exposures to AN. We found some evidence that neuropsychological impairment may be induced by exposure to acrylonitrile.

Key words: Acrylonitrile; Neurobehavioral functions; Neurotoxicity

Introduction

Acrylonitrile (AN) has been defined as a human neurotoxicant although not at low exposure levels (1-3). While most reports have focused on acute neurotoxicity after poisonings, there has been no systematic study on its chronic effects on the nervous systems in humans at lower exposure levels. Previous occupational studies indicated higher prevalence of neurosis syndrome in the workers exposed to AN (4), and several case reports mention misdiagnosing of acute AN poisoning as Encephalitis B, Parkinson's diseases and Epilepsy (5). In addition, the delayed encephalopathy, peripheral polyneuritis, mental disorder, neuropsychiatric sequelae and multiple system atrophy were also reported in the AN poisoning induced by single AN exposure or mixture of AN with other toxicants (5-9). Most of these studies were descriptive. We examine neuropsychological outcomes in exposed workers focusing on the potential neurotoxic effects of AN.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Results

The comparison of the profile of mood states among groups in shown in Table 2. Except

for vigor, all scores of negative moods (anger, confusion, depression, fatigue, tension) were significantly higher in the exposed groups than in the non-exposed group. Scores of mood of tension, depression, anger, fatigue and confusion were higher for monomer workers than fiber workers.

The results of the remaining test of the NCTB are shown in Table 3. Simple reaction time was longer in the two exposed groups (287.20 and 271.80) than unexposed workers (248.37). In the digit span test, the scores in the backward sequence were lower for both exposed groups (6.16 and 5.90) compared to unexposed workers (7.84) indicating poorer performance for exposed workers. However, the score of forward sequence were higher for the acrylic fiber workers (11.60) compared to unexposed workers (10.59) indicating better performance among these exposed workers. The scores of manual dexterity measured in the Santa Ana test showed little difference among groups with the exception of slightly poorer performance in the dominant hand among acrylic fiber workers (42.38) compared to unexposed workers (44.24). Performances in the digital symbol test were similar in all three groups. There was poorer performance in the Benton Visual Retention test for both groups of exposed workers (8.20 and 8.17) compared to unexposed workers (8.55). Poor performance was also observed in the Pursuit Aiming II test among exposed groups.

We examine trends of effects by duration of AN exposure among monomer and fiber workers in Table 4. There is no trend for duration of exposure with the mood and performance indicators for the monomer workers. There is decreasing performance among the acrylic fiber workers for tension, depression, anger, and vigor. Simple reaction time also displayed a trend with duration of exposure for the acrylic fiber workers (268, 284, 299). Digital span was

[illegible]

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